

0-6496: Quantifying the Effects in Order to Optimize the Use of Grade 3 and Grade 4 Seal Coats

Background

Since the Texas Department of Transportation (TxDOT) has almost 80,000 centerline miles of roadway to maintain, many of them routinely maintained with seal coats, this project was developed to establish guidelines for optimal seal-coat grade selection. The project was also to establish comparative data for tire-pavement interface noise levels generated by various types of seal coats.

What the Researchers Did

Researchers conducted district interviews and surveys to establish current practices and reasons for seal-coat grade selections. Researchers then performed a noise evaluation of various seal-coat pavement surfaces using onboard sound intensity (OBSI) test procedures. Finally, the researchers compared Project Management Information System (PMIS) historical performance data for Texas seal coats to determine differences in performance between Grade 3 (see Figure 1) and Grade 4 (see Figure 2) seal coats. Seal-coat grade selection guidelines were developed based on all compiled information.

What They Found

A number of districts have moved to exclusive use of Grade 4 seal coats during the last several years, and many of those still using both Grade 3 and Grade 4 are using considerably less Grade 3 aggregate. The predominant factor cited for this change to using finer seal-coat grade is lower initial cost, allowing coverage of more area with

the often inadequate funding available for preventive maintenance purposes. For most districts using both grades, the traffic level of the roadway is a primary factor when selecting seal-coat grade. Roadway proximity to dwellings and potential for windshield breakage are other factors usually considered.

Researchers found PMIS historical performance records to indicate Grade 3 seal coats should perform at least one to two years longer than Grade 4 seal coats, all other factors being equal. Additional service length may be possible with Grade 3; conclusive definition of the length of seal-coat service was not possible.

OBSI noise testing found Grades 3, 4, and 5 seal-coat average noise levels to be 106.2 dBA, 105.5 dBA, and 104.5 dBA, respectively. These averages are somewhat higher than average noise levels reported for other types of pavement surfaces in earlier studies. Average seal-coat noise levels are followed closely by those for continuously reinforced concrete

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pavement (CRCP). Permeable friction course (PFC) surfaces tend to be much quieter, on average. However, there is significant overlap in the ranges of noise levels from all of the pavement types. For that reason it is possible for a Grade 4 seal coat to be quieter than a Grade 3 seal coat, and it is possible to have a PFC just as loud as any of the seal-coat grades or CRCP.

What This Means

Researchers recommend:

- Grade 3 seal coats should be used in lieu of finer seal-coat grades whenever wheel paths are heavily flushed and no other positive treatment is being used to mitigate early return of texture loss.
- A Grade 3 seal coat should be expected to adequately perform at least one to two years longer than a Grade 4 seal coat in any given location.
- Grade 4 seal coats should generally be used in lieu of Grade 3 unless district experience indicates a Grade 3 seal coat is likely to provide 25 to 35 percent longer service life with similar total life maintenance expenditures for the application being considered.
- Grade 4 seal coats are recommended in lieu of Grade 3 when roadside noise level is a primary consideration. However, use of Grade 4 cannot be relied on to provide noticeably quieter roadside environments than would have been provided using Grade 3.

- TxDOT should continue to monitor both the test sections placed during this research project and performance at large of seal-coated pavements to better define expectations for performance lives from the various seal-coat grades.



Figure 1. Fresh Grade 3 Lightweight Aggregate Seal Coat.



Figure 2. Fresh Grade 4 Lightweight Aggregate Seal Coat.

For More Information

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